

Recent renewable energy costs in Japan: policy and regulation problems

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Outline

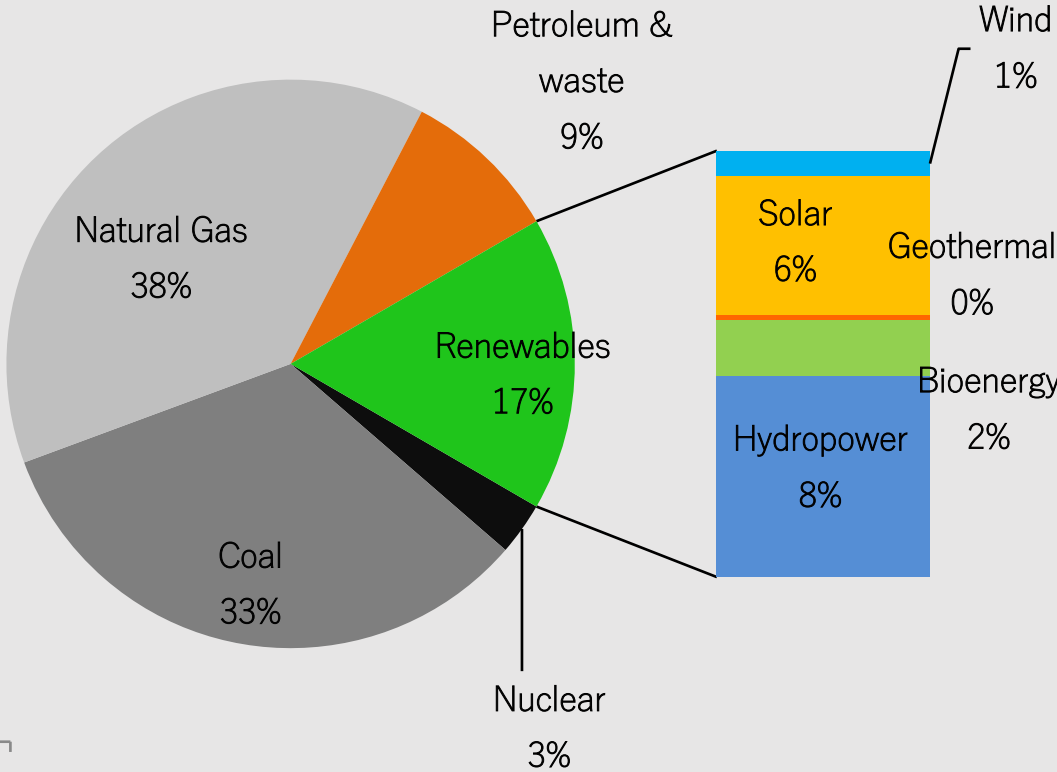
- Renewable energy status in Japan
- Cost comparison between Japan and other countries
- Analyzing high cost in Japan: case of solar and wind
- Conclusion

Growing renewables under FiT law

However, only solar PV has been prominence.



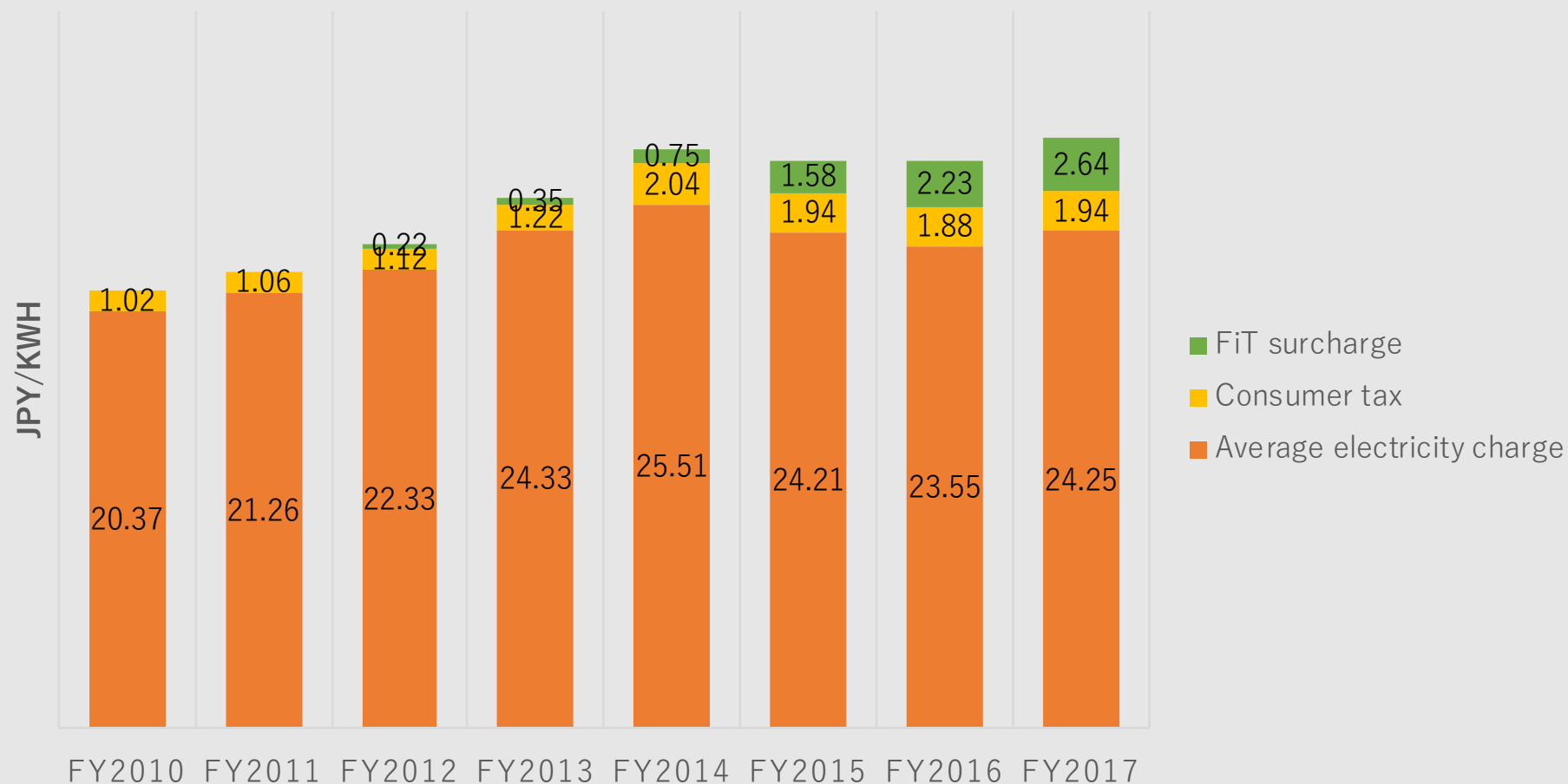
Trends of share of renewable electricity



Japan's electricity mix in FY 2017 (preliminary)

Escalating FiT surcharge

- FiT surcharge was 2.64 JPY/kWh(=20EUR/MWh) in FY2017 which was account 9% of electricity bill for residential consumers.



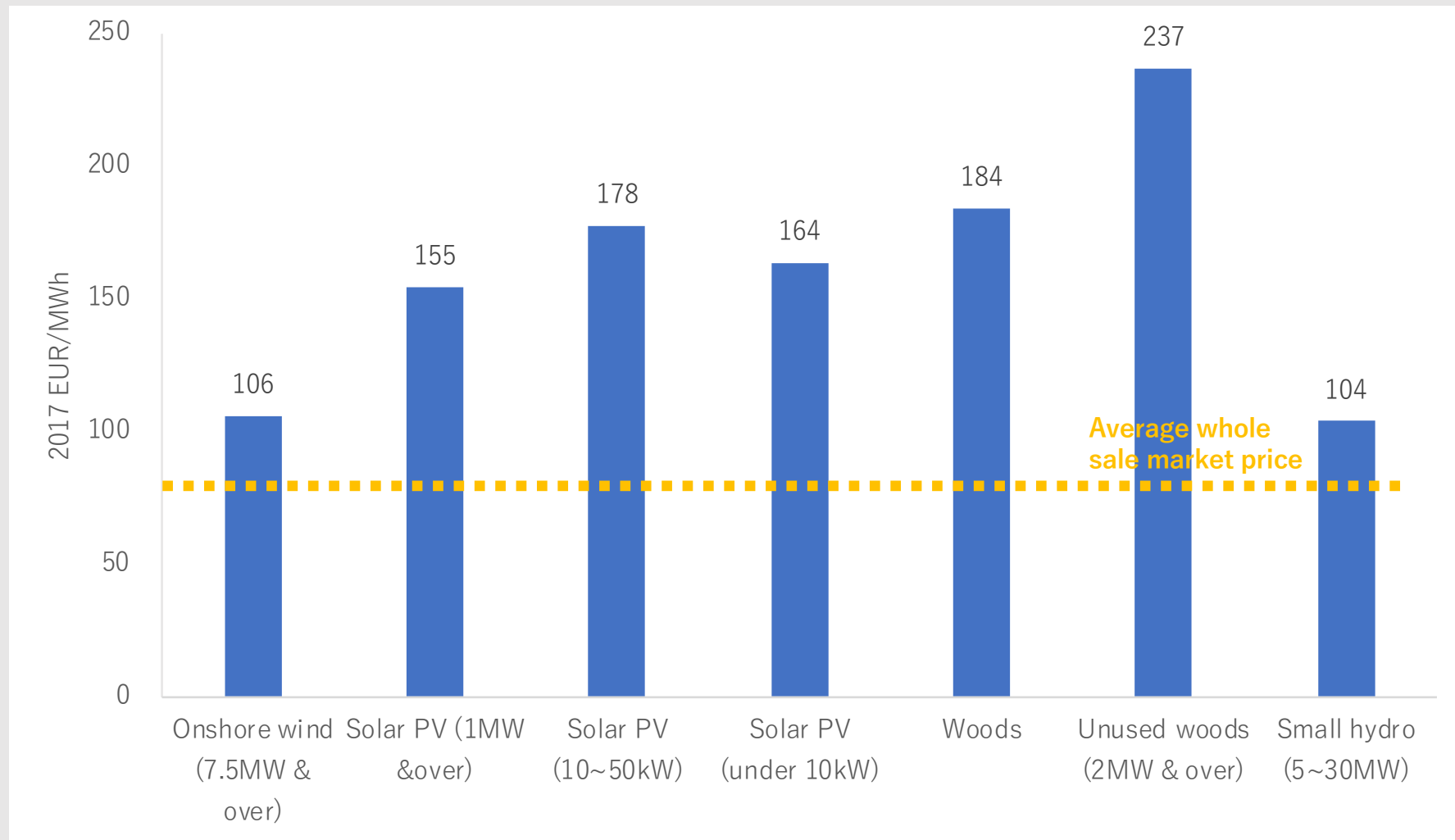
Cost comparison between Japan and other countries

Economic: estimated generation costs

- Methodology: LCOE, Levelized Cost of Electricity
- Conditions and assumptions
 - Investment cost, O&M cost, fuel costs for bioenergy, and capacity factor are referred from METI.
 - Discount rate is represented by financing costs in this study.
 - “Property tax” is included, but “consumer tax” is excluded.
 - Operational years
 - 20 years (based on FiT contract)
 - Depends on technological lifetime

LCOE in 2017

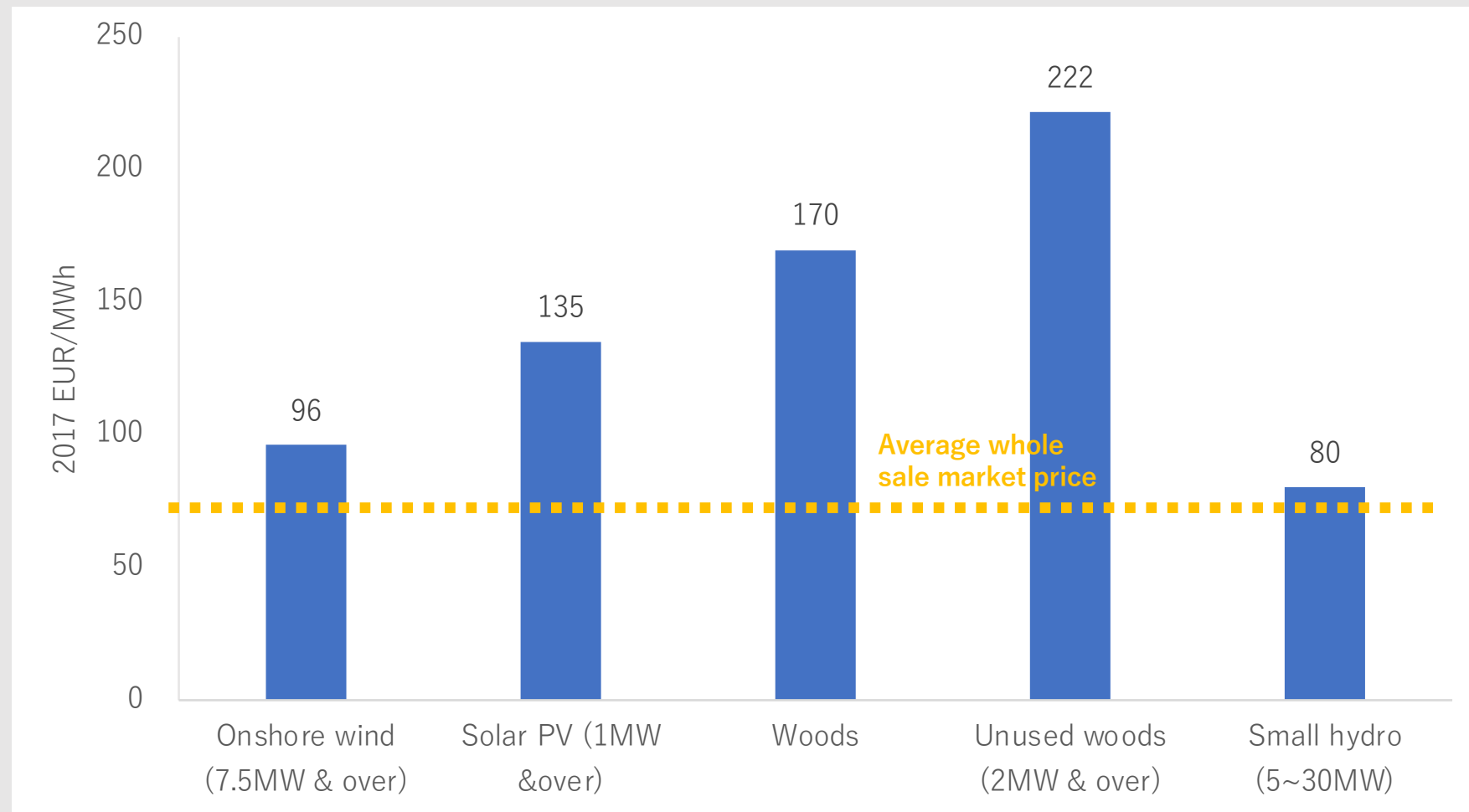
(uniform operational year: 20years)



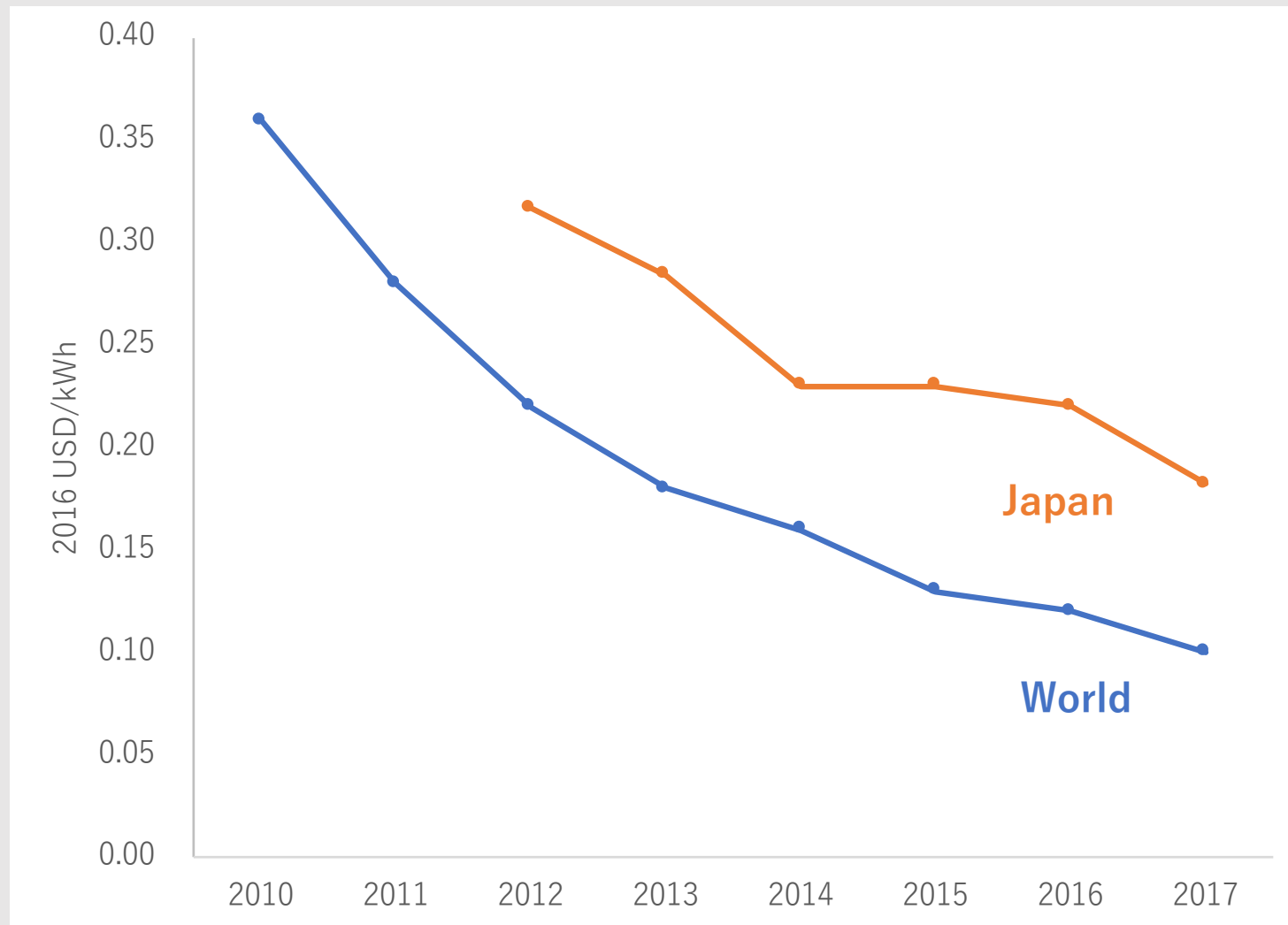
LCOE in 2017

(operational years are differentiated by technology)

25 years: solar and wind; 40 years: bioenergy and hydro power

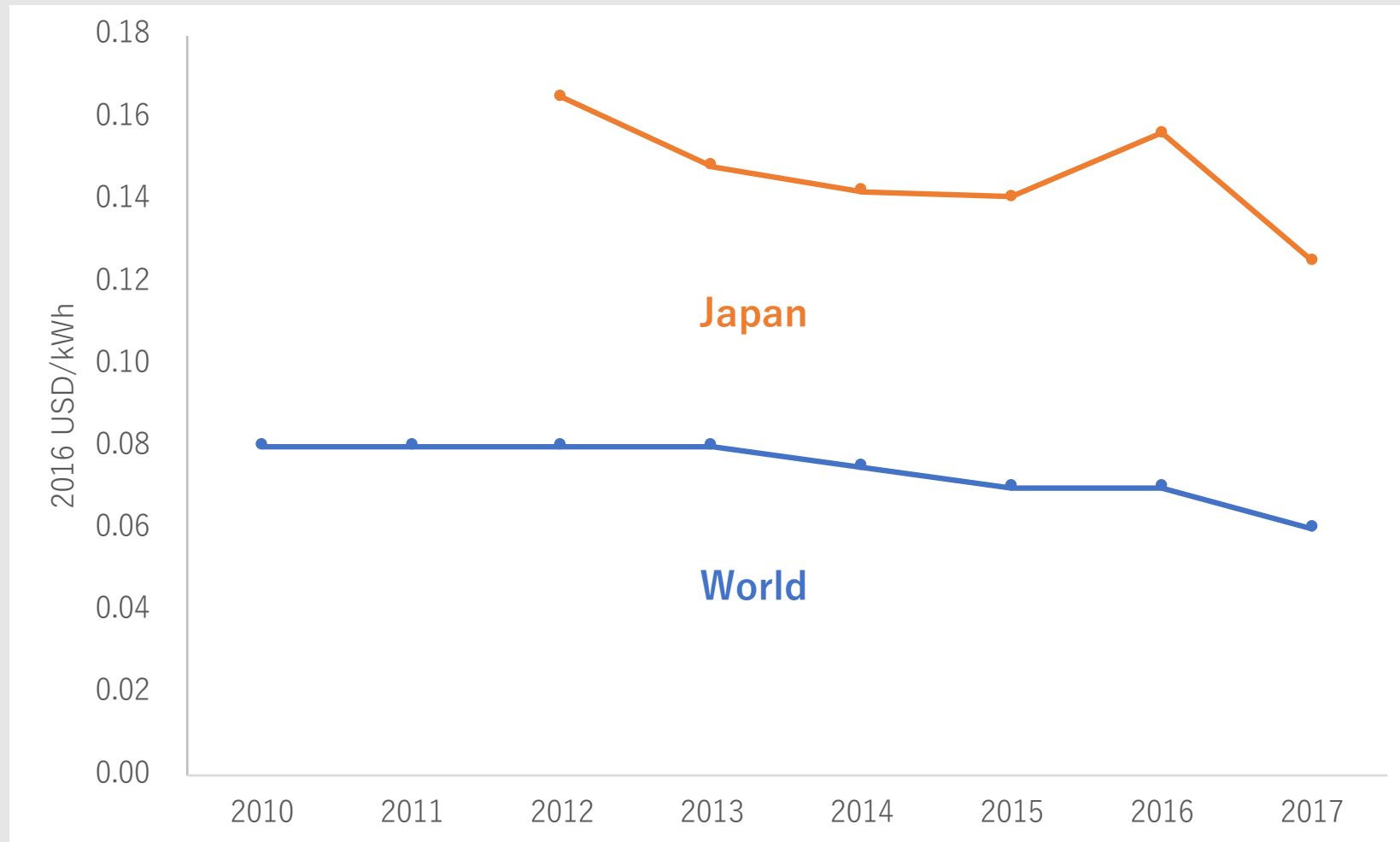


LCOE comparison between Japan and the world for utility scale solar PV



Worlds LCOE data comes from IRENA (2018) Renewable Power Generation Costs in 2017

LCOE comparison between Japan and the world for onshore wind



Worlds LCOE data comes from IRENA (2018) Renewable Power Generation Costs in 2017

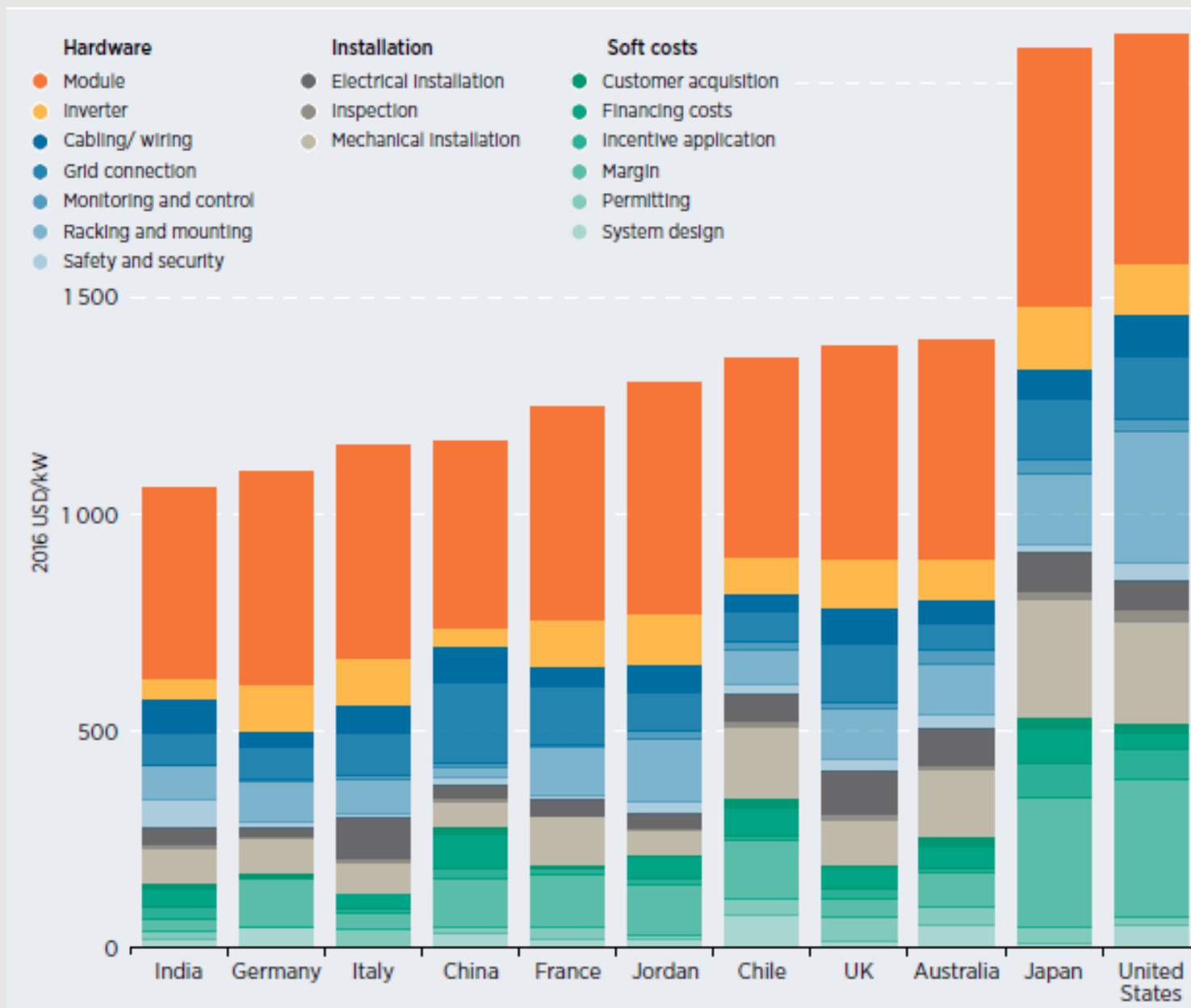
Analyzing high cost in Japan: case of solar and wind

Comparing factors which decide LCOE (case of utility scale solar PV in 2017)

	Germany	UK	US	Japan
Investment cost(USD/kW)	950	990	1120	2753
Annual O&M cost (USD/kW)	12.5	12.5	15.0	45.5
Capacity factor (%)	11	11	19	16
WACC (%)	2.44	3.36	3.96	2.89

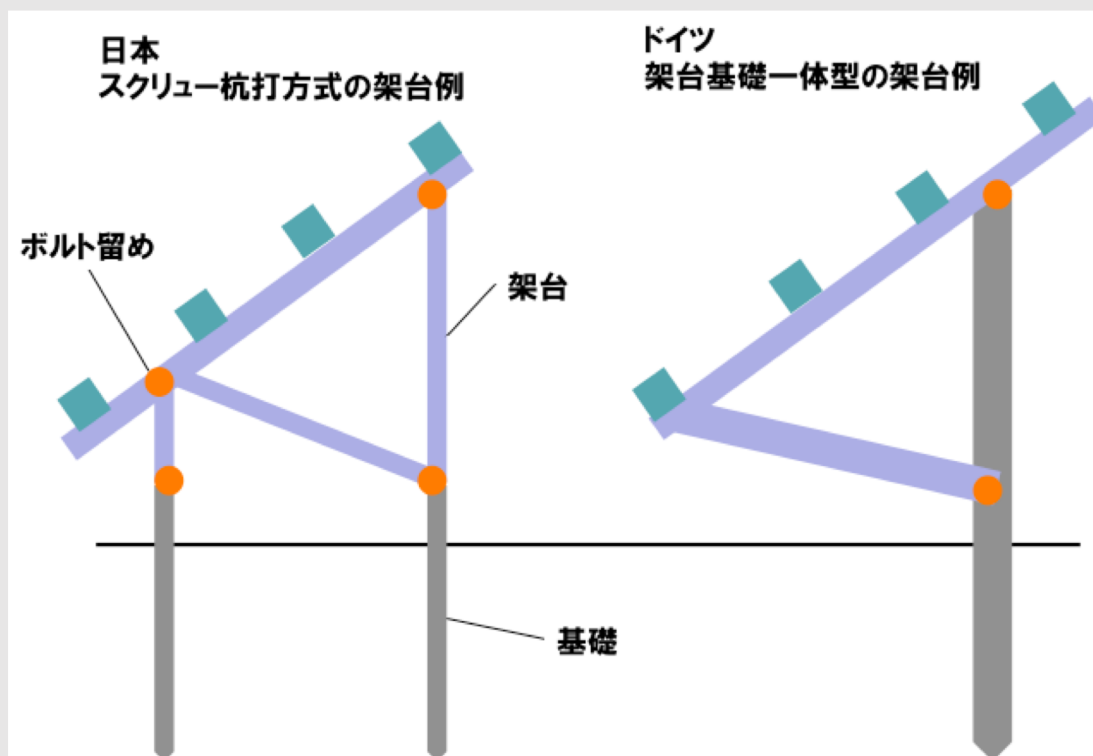
Source: Bloomberg New Energy Finance & METI

Breakdown Investment Cost of Utility Solar PV



Some Findings from Our Research

Mounting system design and installation machines may have big impacts on installation work costs.



Example of Japanese mounting design

Example of German mounting design



Sample of a drilling machine in Japan

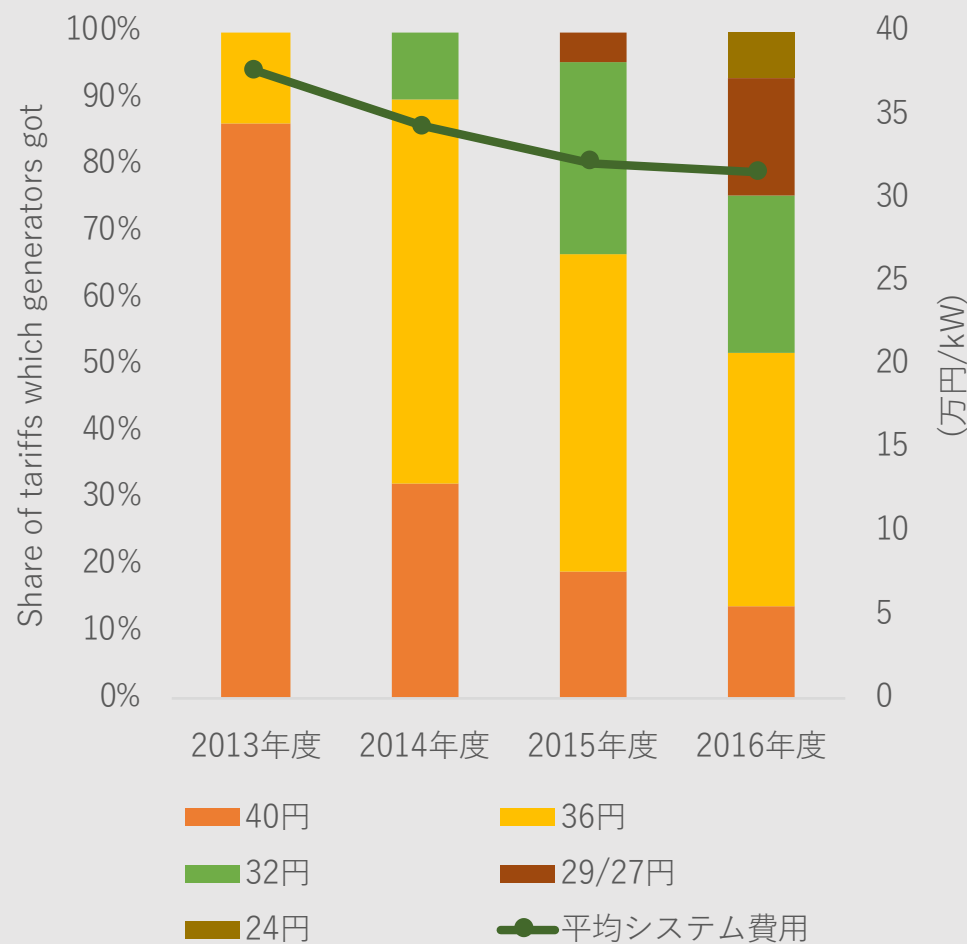


Sample of a drilling machine in Germany

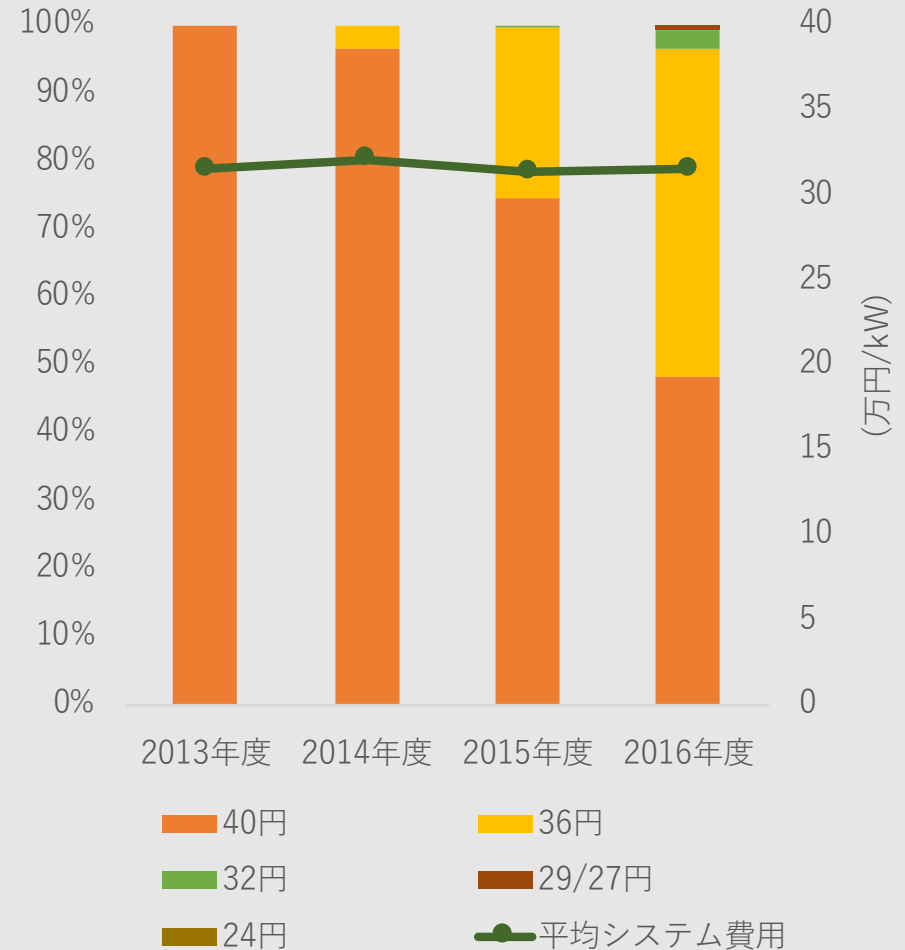
Kimura and Zissler (2016) Comparing Prices and Costs of Solar PV in Japan and Germany: The Reasons Why Solar PV is more Expensive in Japan, Renewable Energy Institute.

Tariffs may affect investment costs

Plants which start operation in each year have gotten different price tariffs. Because tariffs may change depending on when they are qualified.



Investment costs and tariffs of solar PV plants (10~2000kW)



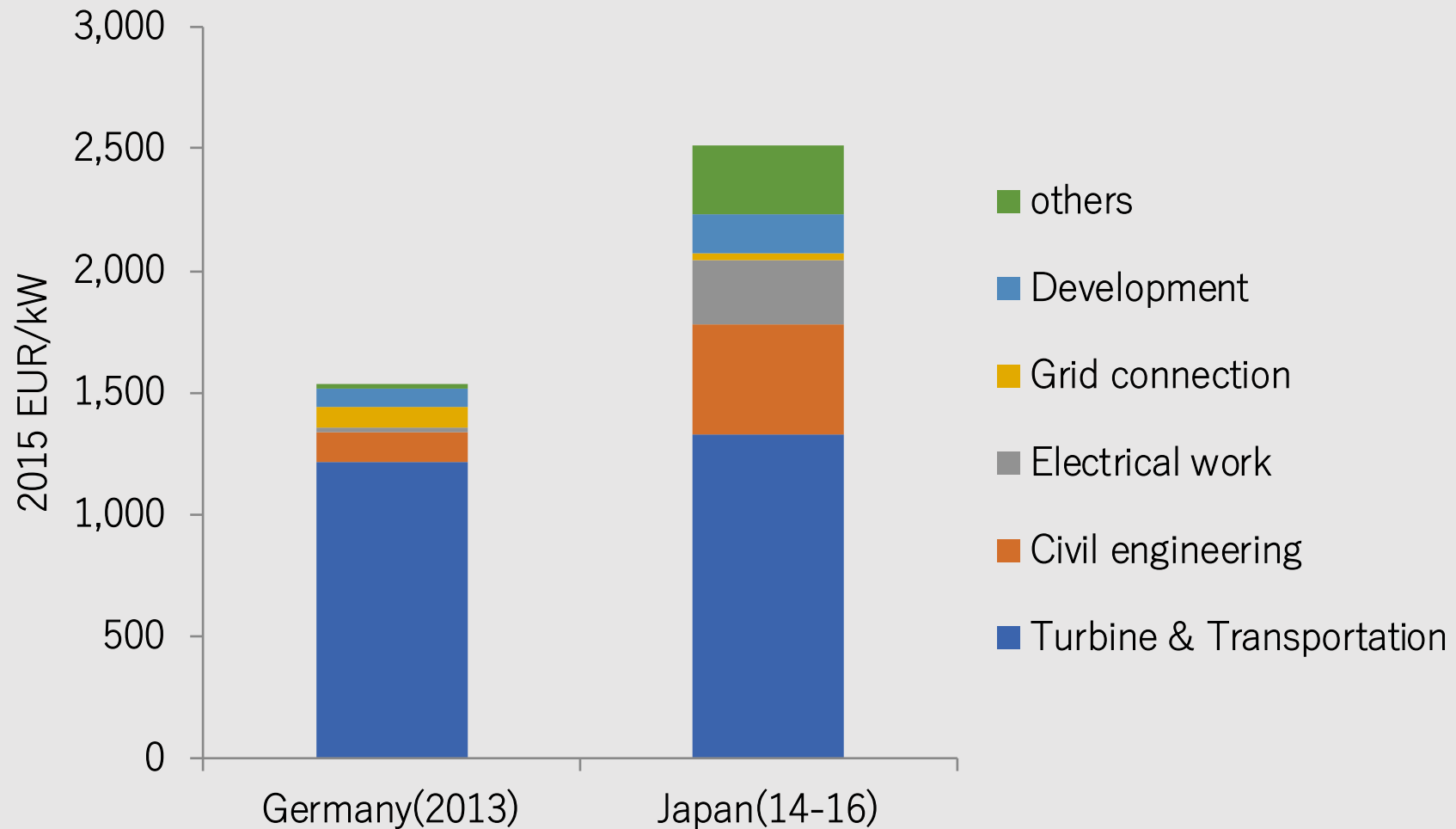
Investment costs and tariffs of solar PV plants (2000kW & over)

Comparing factors which decide LCOE (case of onshore wind in 2017)

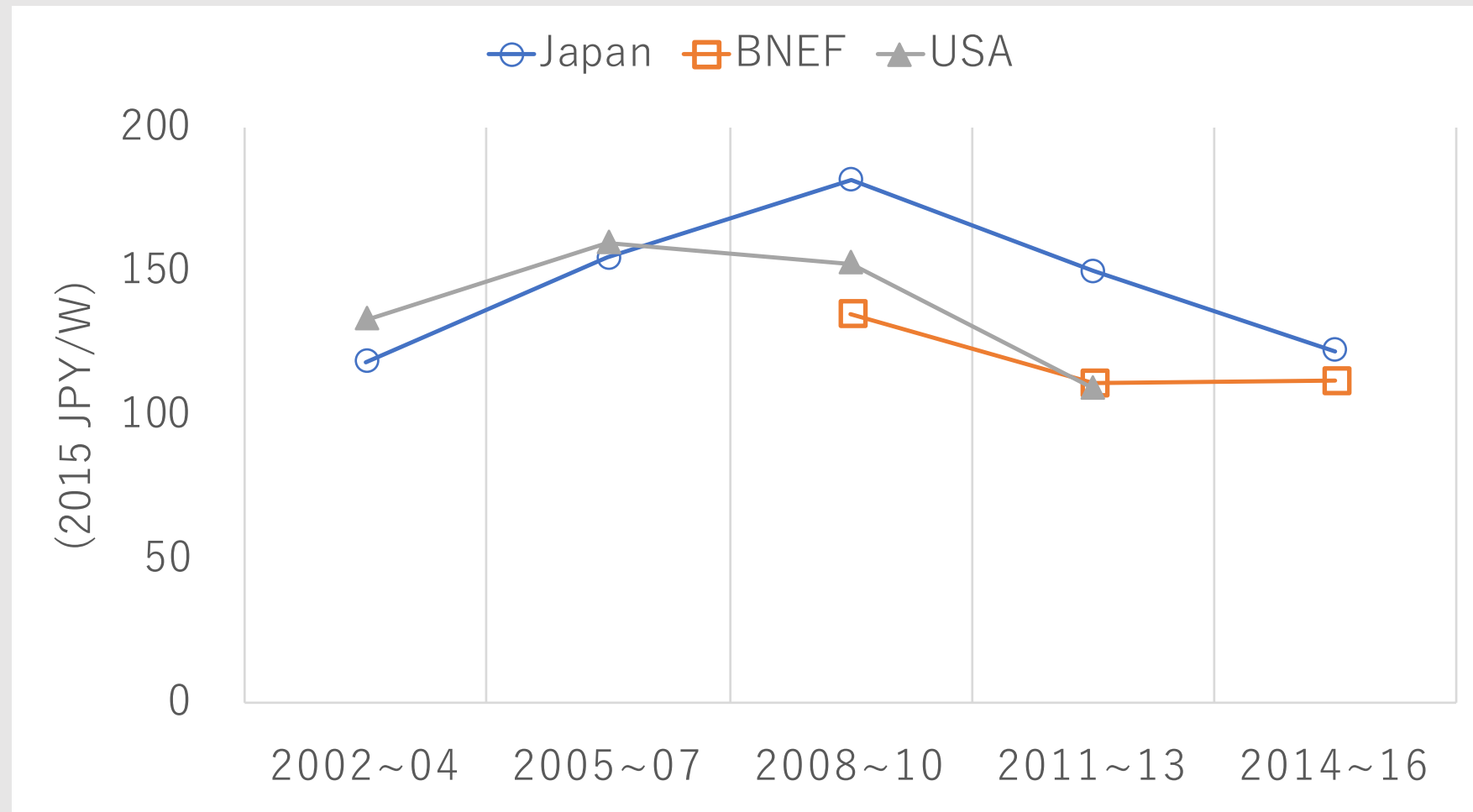
	Germany	UK	US	Japan
Investment cost(USD/kW)	1,680	1,700	1,700	2,464
Annual O&M cost (USD/kW)	28	24	30	83
Capacity factor (%)	30	31	37	26
WACC (%)	2.34	4.17	4.00	3.90

Source: Bloomberg New Energy Finance & METI

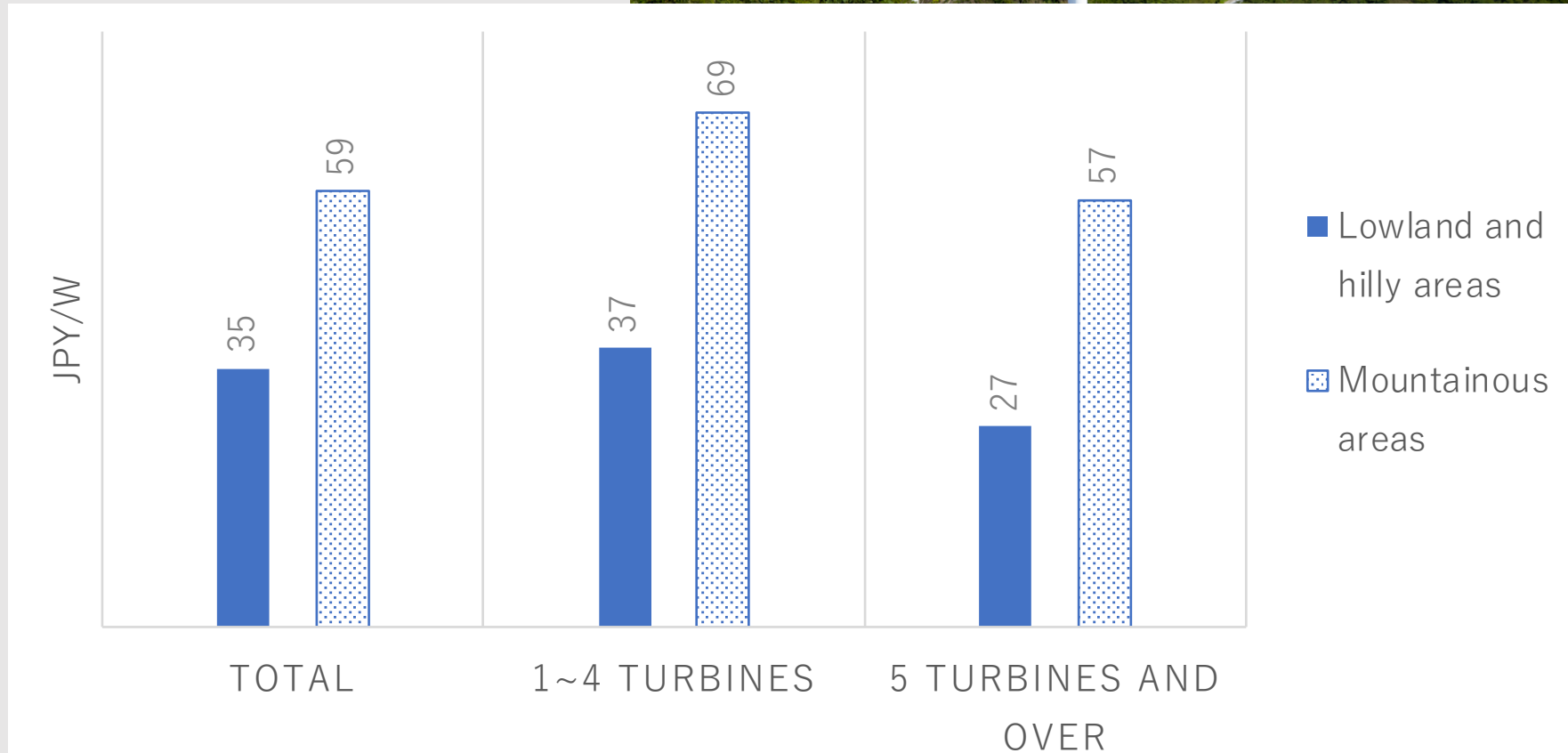
Breakdown Investment Cost of Onshore Wind power in Germany and Japan



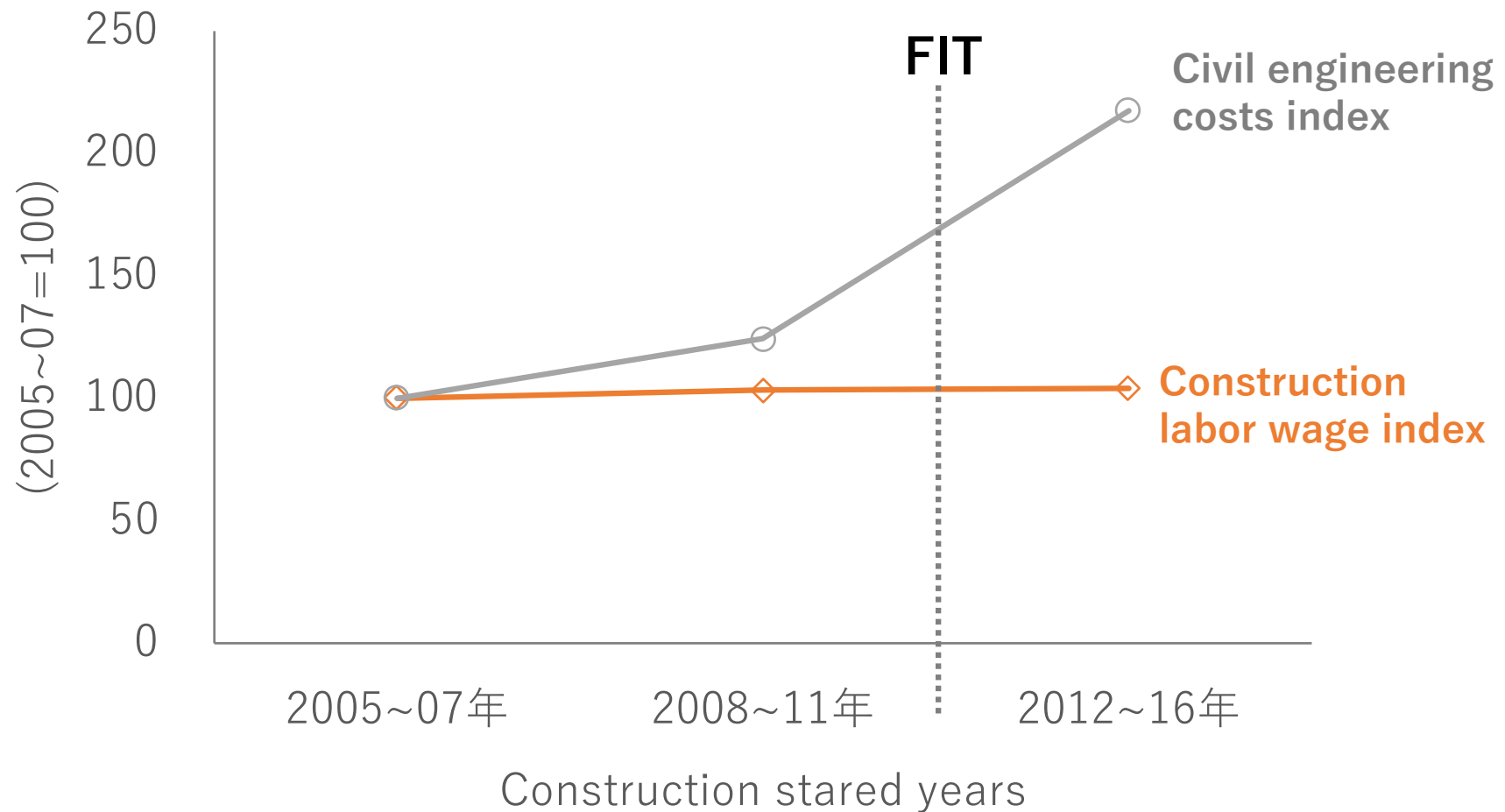
Wind turbine costs in Japan have decreased after FITs introduced to international price level



Civil engineering work costs vary from terrain



Tariffs also may affect wind power investment costs



Source: Kimura (2017) An analysis on wind turbines and construction work costs in Japan

Conclusion

- Remark: Environmental conditions should be considered.
- FiT may have big impacts on renewable energy in positive and negative ways.
- Policy framework and administrations are critically important.
 - FIT qualification mechanism which plant operators could finalize tariffs they would receive and which there was no deadline of operational. (This mechanism was revised)
 - Policy makers could not know “real cost” if FiT affected their costs.